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ABSTRACT

The purposes of the study were to make an analysis of the status of science teachers in the Allen Parish school system (Louisiana) for the 1969-70 school year, to identify the problems of science instruction, and to show a breakdown of laboratory exercises performed by science consultants during an inservice summer session. The first part of the study analyzes the age, sex, experience, and other factors relating to teachers that are generally considered to influence the quality of their instruction in the area of science education. The second part is an analysis of goals, problems, and recommendations for the improvement of science education in the school system. The final section of the study provides a listing of demonstrations, materials, and experiments presented by science consultants during the 1969 inservice summer session. This work was prepared under an ESEA Title III contract. (Author/JR)

SCIENCE

[illegible]

[illegible] GRADES 7-12

A SURVEY AND STUDY OF ALLEN PARISH SCHOOLS IN THE AREA OF SCIENCE EDUCATION

BY

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Submitted to the Allen Parish School Board in Partial Fulfillment of the Requirements for ESEA, Title III

CHAPTER I

I. THE PROBLEM

Statement of the problem. It is the purpose of this study to make an analysis of the status of science teachers in the Allen Parish school system for the 1969-70 school year and, further, to show a breakdown of laboratory exercises performed by science consultants during an inservice summer session (1969); and to identify the problems of science instruction in the Allen Parish school system.

The first part of this study analyzes their age, sex, experience and other related factors that are generally considered to affect the quality of their instruction of boys and girls in the area of science education.

The second part of the study is an analysis of goals, problems and recommendations for the improvement of science education in the Allen Parish school system.

The third part of the study gives a breakdown of laboratory exercises performed by science consultants during the 1969 inservice summer session.

Delimitations. The investigation is related to science teachers in Allen Parish schools. It is further related to an analysis of the following factors: age, sex, salary, college preparation, certification, tenure, experience, and the teaching load of the science teacher.

Importance of the study. There has been a great deal of work done concerning the status of science teachers in the State of Louisiana but, in comparison, very little writing has been done with reference to the status of science teachers in any individual school in the Allen Parish school system. Vast improvements have taken place in science education in the past ten years and this survey will make it possible to present a status picture of the conditions existing in the Allen Parish school system at the present time.

II. DEFINITIONS OF TERMS USED

Public approved school. In this survey this term refers to any elementary or secondary school conducted within the parish under the authority and supervision of a parish or city school board and supported and controlled by the state.

State approved school. In this survey any school that is approved by the State Department of Education of Louisiana is considered such.

Experience. This term is used to refer to the total combined years of service as a teacher and/or principal.

Tenure. Tenure in present position in this survey refers to the total number of years of service in which the teacher has been employed in a given parish.

III. SOURCES OF DATA

The materials and data compiled and used in this study were gathered from the following sources:

(1) Information pertaining to the classification and size of the secondary schools was obtained from the State Department of Education Bulletin Number 740.[1]

(2) Information pertaining to total experience, teaching loads, teaching combinations, and college preparation was obtained from questionnaires submitted by the science teachers in Allen Parish schools.

(3) Information pertaining to academic degrees and types of certificates held was obtained from questionnaires submitted by the Allen Parish science teachers.

(4) Information pertaining to salaries, tenure, age, and sex was obtained from the teacher retirement records on file in the Teacher Retirement System of Louisiana.

IV. ORGANIZATION OF THE STUDY

The first chapter presents the statement of the problem and its delimitations along with definitions of terms used. There is no chapter on related literature in this study. Chapter II presents the data in tabular form and points out certain trends. This chapter also contains a summary and conclusion of the study. Chapter III is the second part of the study and analyses goals, objectives, content, probiems and

[1]Louisiana School Directory, Bulletin Number 740 (Baton Rouge, Louisiana: State Department of Education, October 1969).

recommendations for the improvement of science education in the Allen Parish school system. Chapter IV is a general breakdown of laboratory exercises performed during an inservice program held during the summer of 1969 at Oberlin, Louisiana.

CHAPTER II

The present section contains data pertaining to the science teachers of Allen Parish public approved schools. It is the objective of this section to classify and describe the status of the science teacher in this parish. Since the position of the science teacher is one requiring high educational qualifications, each factor is separated and analyzed to determine the type of person holding this teaching position.

The status of the science teachers in Allen Parish are presented in tables in terms of the various factors being considered in this study. The median was used as a measure of central tendency in order to present the status of the science teacher in terms of the factors being studied.

The State of Louisiana is composed of sixty-six administrative school units; of this total, sixty-four are the individual parishes; the two remaining are the city systems of Monroe and Bogalusa. Allen Parish is one of the sixty-four individual parishes being studied.

As shown in Table I, for the school year 1969-70 there were six of the state approved public schools in Allen Parish. Two of the six public schools listed in the Louisiana School Directory have grades of one through twelve; three schools consist of grades kindergarten through twelve; and one school has grades of seven through twelve.

The enrollment, including junior high through high school, is approximately 4300 pupils.

TABLE I

SCHOOLS IN ALLEN PARISH BY GRADES TAUGHT

NAME OF SCHOOL	GRADES TAUGHT
Elizabeth	K-12
Fairview	1-12
Kinder	7-12
Oakdale	K-12
Oberlin	K-12
Reeves	1-12

<u>Age and sex of Allen Parish science teachers</u>. A question which always seems to present itself when a group of individuals is considered is that of age and sex. Table II presents the distribution of the science teachers of Allen Parish according to age and sex.

The Allen Parish public schools employ a total of thirty science teachers. Eleven of this total are women, or 36.6 per cent; nineteen, or 63.4 per cent are men. The ratio of men science teachers to women science teachers is approximately two to one. On a nationwide comparison, Allen Parish is slightly over the average of 1.9 men teachers to women teachers in this subject area.

The median age for the eleven women science teachers is 42.5 years; the median age for men science teachers is 41.37 years. The median age of all science teachers in Allen Parish is 41.7 years.

<u>Experience of science teachers</u>. The position of the science teacher is a vital post in any large or small school system. The success of imparting to the student the realization that scientific knowledge is a basic part of our culture and as such contributes to the enrichment of life for all can be emphasized by the science teacher. The science teacher's job today is an attractive position. It carries prestige and can afford greater opportunity for professional and personal development. To be successful, it is not sufficient alone for the science teacher to be prepared; he must grow continuously as long as he remains in teaching of boys and girls.

Table III presents the distribution of the total experience of science teachers in the Allen Parish study. This table takes into consideration the individual distribution of both men and women science teachers.

TABLE II

AGE OF ALLEN PARISH SCIENCE TEACHERS

Age	Classification of Teachers Men	Women	Total
60-69	1		1
50-59	2	2	4
40-49	8	5	13
30-39	4	3	7
20-29	4	1	5
TOTAL	19	11	30
MEDIAN	41.37	42.5	41.7

TABLE III

COMBINED TEACHING EXPERIENCE OF SCIENCE TEACHERS

Years of Experience	Classification of teachers		
	Men	Women	Total
35-39	1	-	1
30-34	1	1	2
25-29	-	3	3
20-24	1	-	1
15-19	2	-	2
10-14	2	1	3
5-9	7	3	10
0-4	5	3	8
TOTAL	19	11	30
MEDIAN	7.71	8.66	8.0

An analysis of the table is as follows: the median total experience of men science teachers is 7.71 years; the median total of women science teachers if 8.66 years. This indicates the women science teachers have a median total experience of .95 years in excess of men science teachers. The median total experience of the combined total number of science teachers is 8.0 years.

This table indicates that the women science teachers of Allen Parish have more total experience than men. Taken as a whole, it would therefore imply that the total years of teaching experience of the men and women science teachers is sufficient enough to warrant the belief that the science teachers for the boys and girls of Allen Parish have an adequate experience to fulfill the basic science objectives set forth in this study.

Certification of science teachers. Teacher certification is a state function. In Louisiana, it is delegated to the State Department of Education and administered by the Certification Department. It involves those provisions and appraisals whereby the State satisfies itself that teachers have met certain minimum qualifications for teaching or for holding public school administrative positions.

To be eligible for employment in the public schools of Louisiana, a teacher must hold a valid teacher's certificate issued by the Louisiana State Department of Education, the requirements of which apply to Negroes as well as whites. No person who lacks this certificate can be employed legally for administrative, supervisory, teaching, or other professional services in the public schools of this state.

Tenure in present position. There is no doubt that the State of Louisiana is able to attract many desirable teachers because of its policy of tenure for the satisfactory teacher. The problems of teachers in other states, who are engaged on an annual basis and who are subject to annual reappointment by lay people as well as by professional supervisors, are well known. It is a precarious existence for both teacher and principal where there is no tenure. Having tenure is conducive to mental health, moral integrity, and professional efficiency of service.

Table IV presents the distribution of the tenure of science teachers in their present position in the state approved public schools of Allen Parish. This table takes into consideration men and women teachers, and the combined total of science teachers.

The median tenure in present position of men science teachers is 6.37 years; the median tenure of women teachers is 5.75 years. This indicates that men science teachers have a median of .62 years of tenure in present position in excess of women. The median tenure of the combined total of science teachers is 6.16 years.

In summarizing, it was found that men science teachers have more years of service in the same position than women. This does not, however, imply that the men science teachers are more firmly established in the teaching position than the women.

TABLE IV.

TENURE OF SCIENCE TEACHERS

Years of Tenure	Classification of teachers		
	Men	Women	Total
35-39	1		1
30-34			
25-29		4	4
20-24			
15-19	2		2
10-14	4		4
5-9	4	2	6
0-4	8	5	13
TOTAL	19	11	30
MEDIAN	6.37	5.75	6.16

Table V is interpreted as follows: of the 30 men science teachers, five hold the Type A certificate. This represents 26.2 per cent of the total. Six teachers hold the Type B certificate, or 31.5 percent; six hold the Type C certificate, or 31.5 per cent; only two male teachers hold the Type T certificate, or 10.5 per cent. Of the eleven women science teachers, six hold the Type A certificate, or 54.5 per cent; none hold the Type B certificate; three hold the Type C certificate, or 27.3 per cent; only two hold Type T certificates, or 18.2 per cent.

The last column in Table V shows the types of certificates held by both men and women. From this table, it is seen that the science teachers of Allen Parish schools hold four types of teaching certificates. The largest percentage of teachers serving the public schools of Allen Parish hold the Type A certificate. There are eleven, or 36.6 per cent of the total. Type C is the next highest, with 30.0 per cent of the combined total.

Two men and two women teachers hold Type T certificates which is 13.4 per cent of the combined total. Course requirements are needed to delete this type of certificate and indications from the survey indicate that remedial work is currently being done to do away with this type of certificate.

TABLE V

TYPES OF CERTIFICATES HELD BY SCIENCE TEACHERS

Type Certificate Held	Classification of teachers: Men		Women		Total	
	Number	Percent	Number	Percent	Number	Percent
A	5	26.2	6	54.5	11	36.6
B	6	31.6			6	20.0
C	6	31.6	3	27.3	9	30.0
T	2	10.6	2	18.2	4	13.4
TOTAL	19	100.0	11	100.0	30	100.0

Certification of Science Teachers. The following types of certificates are now issued by the State Department of Education:

Type A. Valid for life for continuous service.

Requirements: A Type A certificate will be issued to any applicant who holds a baccalaureate or higher degree awarded by an approved college with credits distributed as hereinafter provided, including general, professional, and specialized education. In addition, the applicant must show at least five years of successful teaching experience.[1]

Type B. Valid for life for continuous service.

Requirements: A Type B certificate will be issued to any applicant who holds a baccalaureate or higher degree awarded by an approved college with credits distributed as hereinafter provided, including general, professional, and specialized education. In addition, the applicant must show at least three years of successful teaching experience.[2]

Type C. Valid for three years.

Requirements: A Type C certificate will be issued to any applicant who holds a baccalaureate degree awarded by an approved college with credits distributed hereinafter provided, including general, professional, and specialized education.[3]

Type T. Trade Certificate. Valid for not more than two years.

Requirements: A Type T certificate will be issued upon application accompanied by satisfactory evidence of completion of the course requirements.

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[1] State Certification of Teachers, Superintendents, Supervisors, Principals, and Librarians, Bulletin Number 497 (Baton Rouge, Louisiana: State Department of Education, October 5, 1943), p. 14.

[2] Ibid

[3] Ibid

Salaries of Teachers in Allen Parish

The approach to the salary problem in recent years has been quite different from the superficial methods employed prior to 1900. Salaries were then largely determined in those early years by one of two methods: Comparison with other communities or by individual bargaining. The former technique was superior to the latter, although little defense could be made for either of them. In all cases, no serious attention was given to costs or standards of living of teachers. School surveys were unknown and expert opinion, had there been any available, probably would not have been favorably received by local boards, who considered it their right and prerogative to determine the salaries and hire the teachers.

Today, however, the principle of scheduling teachers salaries is one that is generally recognized. Elsbree[4] says that it is no longer the question whether or not a school system shall have a salary schedule--the problem today is how to develop the most effective schedule. Bartlett and Neel[5] state that the distinct advantage of the salary schedule over bargaining in the selection of a professional worker (teacher) is that the basis for selection is shifted from bargaining to fitness. In a sense the salary schedule tends to limit the operation of supply and demand. The selection is therefore focused upon factors such as: experience, training, and general fitness of the position with the result

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[4] Willard S. Elsbree, <u>The American Teacher</u> (New York: American Book Company, 1939), p. 453.

[5] Lester W. Bartlett and Mildred B. Neel, <u>Compensation in the Professions</u> (New York: Association Press, 1933), p. 25

that better teaching personnel will be employed.

In 1943, a group of Louisiana parish superintendents, together with several members of the education faculty of Louisiana State University, agreed upon some basic principles which would be helpful in establishing a salary schedule based on education, experience, merit, and responsibility. Many issues were confronted and one of these was the inequalities of salaries of Negro and white teachers.

Largely as a result of this group action, a few years later an act was adopted by the Legislature of Louisiana. This act authorized a minimum salary of $2400 for a teacher with a Bachelor's degree and $2500 for a teacher with a Master's degree. In addition the salary of a teacher with a Bachelor's degree would be increased $100 annually until a maximum of $3200 was reached; similar increases would be granted to a teacher holding a Master's degree until a maximum of $3600 was attained.[6] The passage of this act has done much in the way of stimulating teachers of both races to become better prepared and qualified to teach in the elementary and secondary schools of the state.

In respect to the salaries of principals, Section 4 of Act No. 155 stated that there was nothing in the Act that would prevent parish or city school boards from providing additional compensation or increments for special teachers, such as principals, assistant principals, coaches, librarians, agricultural teachers, home economic teachers, music teachers, or any other teachers.[7]

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[6] Act No. 155, Regular Session 1947, <u>Acts of Louisiana 1947</u>, p. 1.

[7] <u>Loc. cit.</u>

In recent years, the United School Committee and Louisiana Teacher groups have worked closely with legislators, the Louisiana State Department of Education and other agencies to uphold teacher salaries. Again, many problems of politics, lack of funds, poor communication between lay groups have resulted in a stymied salary schedule which is pending as of this writing.

Table VI presents the distribution of salaries among the Allen Parish science teachers. This table includes both sexes and a combined total is indicated to show the variation in salary distribution.

The median salary received annually for men science teachers is $6887.50; the median salary received annually for women science teachers is $7533.33. This indicates that the women teachers receive a median salary of $645.83 in excess of the men teachers. The total combined median salary of all Allen Parish science teachers is $7375.00

Observation of the table more closely indicates that the lowest salary received is in the range group of $3450-3949. The highest salary group is held by five teachers in the range of $8950-9449.

TABLE VI

SALARY OF ALLEN PARISH SCIENCE TEACHERS

Salary in Dollars	Classification of Teachers Men	Women	Total
8950 - 9449	4	1	5
8450 - 8949	-	-	-
7950 - 8449	3	2	5
7450 - 7949	1	3	4
6950 - 7449	1	3	4
6450 - 6949	4	-	4
5950 - 6449	4	1	5
5450 - 5949	2	-	2
4950 - 5449	-	-	-
4450 - 4949	-	-	-
3950 - 4449	-	-	-
3450 - 3949	-	1	1
2950 - 3449	-	-	-
TOTAL	19	11	30
MEDIAN	6887.50	7533.33	7375.00

Training of Allen Parish science teachers. The professional education that a teacher should have cannot be set down with any degree of definiteness in terms of courses or hours. It is without question, however, that he should have an education which leads him to an understanding of the nature of our complex society and of the part that the schools play in it.

For the purpose of showing the educational or professional qualifications of the Allen Parish science teacher in terms of highest degrees held, Table VII is presented. This table indicates the degree held. In each case the highest degree held by the science teacher is used as the basis for tabulation. In other words, a person who had both his Bachelor's and Master's degrees was shown as holding the Master's degree.

By way of analysis of this table, it is indicated there are thirty science teachers serving in the Allen Parish state accepted and state approved schools. With an appropriate breakdown of the two sexes in this table, it is indicated that nine men teachers hold the Master's and Bachelor's degree. This is 47.4 per cent of all men teachers. The Bachelor's degree is held as the highest degree by ten men. This is 52.6 per cent of the men teachers. It may therefore be said that 100 percent of the Allen Parish men science teachers hold a Bachelor's degree or better and the Allen Parish School Board should be commended on its efforts to employ teachers having these standings.

An analysis of Table VII for women science teachers is also one to be worth citing. Six women teachers, or 54.5 per cent of all teachers, hold degrees above the Bachelor's. Four women teachers, or 36.3 per cent, hold only the Bachelor's degree. One teacher does not have this degree and, according to a survey made, this teacher is attending college at the present time and is approaching the Bachelor's degree while teaching science in Allen Parish. A commendable feature presented in Table VII is that 96.6 per cent of all science teachers in this parish have professional degrees relative to general education.

Table VII does not include those teachers with Master's degrees plus thirty additional hours of training. It was found by questionnaire that two teachers have the Master's degree plus thirty hours; that ten, or 30.0 per cent of this group of science teachers, are presently enrolled in either graduate or undergraduate work for the 1969-70 school year; and that eight, or 26.6 per cent of these teachers, have had special National Science Foundation work in areas of Earth Science, Biology and Chemistry.

In summarizing, it is indicated that the Allen Parish science teachers have outstanding qualifications insofar as professional degrees are concerned. In view of the newer curriculum, many teachers indicated by questionnaire they are trained to teach boys and girls additional newer science programs.

<u>Teaching loads of science teachers</u>. One of the biggest problems that occurs in the distribution of the science teacher's time is the division of his time between instruction and other duties. The classroom teacher of today has many more duties than teaching and the boys and girls are losing much in quality education. Because of many classloads, teachers have difficulty in directing their instruction towards the objectives of science education. Interest and active participation by the students is also cast off and students with aptitude are not encouraged to continue past secondary science study. In order to do

TABLE VII

HIGHEST DEGREE HELD BY TEACHERS

Degrees	Classification of Teachers					
	Men		Women		Total	
	Number	Percent	Number	Percent	Number	Percent
Master's	9	47.4	6	54.5	15	50.0
Batchelor's	10	52.6	4	36.3	14	46.6
Less than Batchelor's			1	9.2	1	3.4
TOTAL	19	100.0	11	100.0	30	100.0

effective teaching, a teacher, according to the Southern Association of Schools, should not have more than two subject areas and at least one unencumbered period per day.

Table VIII presents an analysis of the number of subjects taught each day by the Allen Parish science teachers. An interpretation of this table is as follows: two men teachers, or 10.5 per cent, teach five subjects each day; five, or 26.3 per cent, teach four subjects; eight, or 42.2 per cent, teach three subjects; two, or 10.5 per cent, teach two and one subject respectfully each day. At most, few teachers indicated that any of their periods were unencumbered throughout the school day.

Conditions of employment. The trend for the betterment of the teaching profession in Louisiana is relatively new. Within the past twenty-five years, teachers have made rapid educational gains through the various laws passed by the State Legislature of Louisiana. These laws are known as the Teacher Welfare Laws.

The Teacher Tenure Law provided a probationary period of three years after which time a teacher was considered a regular employee. This created more security and stability in the school systems.

The Teacher Sick Leave Law allowed the teacher to have time off in case of illness without loss of pay.

Another of the laws passed which aided teachers was the Teacher Sabbatical Law. This act gave each teacher an opportunity to improve his professional status without hindering his position and without loss of pay.

TABLE VIII

NUMBER OF SUBJECTS TAUGHT PER DAY BY SCIENCE TEACHERS

Teachers Teaching	Classification of Teachers					
	Men		Women		Total	
	Number	Percent	Number	Percent	Number	Percent
Six Subjects	-	-	-	-	-	-
Five Subjects	2	10.5	2	18.9	4	13.3
Four Subjects	5	26.3	-	-	5	16.6
Three Subjects	8	42.2	6	54.5	14	46.8
Two Subjects	2	10.5	2	18.9	4	13.3
One Subject	2	10.5	1	7.7	3	10.0
TOTAL	19	100.0	11	100.0	30	100.0

The last of the Teacher Welfare Laws was the Teacher Retirement Law. This law provided an allowance to those teachers who were old enough to retire. This act along with the others mentioned has created stability in the Louisiana school systems. It is these factors that have made the teaching profession an attractive position and have placed the State of Louisiana on an educational level of high standards.

CHAPTER III

SUMMARY

It is the purpose of this study to determine the status of the Allen Parish science teachers for the period of the 1969-70 school session. An analysis of the data concerning the teachers of the state approved and state accepted schools of Louisiana has been made to determine the status of the persons responsible for providing the science educational leadership now operating in these schools.

All data for this study were gathered from questionnaires submitted by the Allen Parish science teachers. Thirty teachers were considered in this study.

To bring the collected data into a unified whole, it would indeed be interesting to describe the typical science teacher of Allen Parish by the summary of the tables representing the group in question.

The typical science teacher of Allen Parish is 41.7 years of age; he has taught a total of 8.0 years, of which he has served 6.16 years in his present position. He is a college graduate with a Bachelor's degree and is working toward his Master's degree.

He receives a salary of $7,375.00 if only a Bachelor's graduate and if he holds a Master's degree he receives $7,875.00, or approximately $500.00 more.

He probably teaches 3.0 subjects per day and sponsors one or more extra curricular activities per day. He is qualified to be teaching in the area of science education and holds a Type B certificate. He is also protected by the Teacher Tenure Law, the Teacher Retirement Law, the Sick

Leave Law and is a member of the Louisiana Teacher Retirement System.

In conclusion, the evidence from this study indicates that the Allen Parish Science Teacher's position is growing into a more desirable professional position. Through the efforts of the Louisiana State Department of Education, the educational requirements for these teachers have been raised sufficiently to warrant other positions of the same type in other states. In passing, it can be stated that the science programs in the state approved and state accepted schools of Allen Parish are being operated by personnel having adequate experience, age, and desired academic qualifications; certainly as far as these can be measured in terms of quantitative units.

AIMS AND OBJECTIVES/GOALS

The objectives of science education in the elementary and secondary schools of Allen Parish are:

1. To impart to the student the realization that scientific knowledge is a basic part of our culture and as such contributes to the enrichment of life for all

2. To assist students to recognize that scientific principles and thought may be relevant in other areas of human concern; e.g.; philosophy, sociology, economics, conservation, etc.

3. To prepare persons to be capable of intelligent and meaningful response to scientific information about the biological and physical world in which they live

4. To help prepare persons of only a secondary school background to earn their livelihood in areas of science

5. To prepare students for advanced study in science.

The science committee agrees that the Allen Parish school system is to be commended for:

1. Providing a continuous science program from grades 1-12

2. Encouraging their teachers to maintain an active interest in professional advancement and including participation in educational organizations

3. Utilizing the many science resources found within the parish

4. Encouraging experimentation in the newer trends of science education

5. Establishing policies that provide modern science facilities in keeping with available finances

6. Outstanding procedures in the selection and placement of their science instructional staff

7. Stimulating boys and girls to continue a marked overall achievement at institutions of higher learning.

The present curriculum in science education is inadequate to achieve the objectives set forth in the following significant ways:

1. There have been no differences in requirements among curricula for students who are preparing for advanced (college level) study in science and for those students who have other educational plans.

2. The present curriculum does not meet our objectives in junior and senior high schools to the extent that new curricula would; that is, new curricula for which materials are now available.

3. There is not sufficient participation by students in the experimental aspects of the learning of science. Specifically, inadequate laboratory experience and field study are not required of the students.

4. Participation in science fairs is considered highly desirable; however, the requirement of science fair projects of all students is abhorrent. This requirement actually can be detrimental to science education.

5. In a practical sense, there has not been sufficient flexibility to encourage adequate classroom trial and evaluation of new and experimental science curricula and study materials. We refer specifically to financial difficulties encountered in the use of such curricula materials as CHEM Study, BSCS, ESCP, Life Science and Physical Science, on a trial basis in the Allen Parish Schools.

In addition, the present curricula in science education could be expanded to better meet the stated objectives in the areas cited below:

I. TEACHER PREPARATION

1. A number of teachers are not well-prepared to teach science. At the 7th and 8th grade levels, upper elementary certification permits a teacher to teach science. These persons are clearly not qualified to teach a laboratory oriented science course.

II. INSTRUCTIONAL MATERIALS

1. There is a great deal of concern among teachers regarding the procedure of ordering and receiving materials of instruction. All material is ordered in the early spring for delivery the following year. The specific troubles are:

a. The amount of money presently allocated for materials of instruction is inadequate. We can operate a textbook oriented course or a demonstration course but not a laboratory oriented course on the amount of money now available.

b. A fund of some sort is needed for those teachers who need money for innovations in teaching. This has been particularly true for those teachers who have attended institutes sponsored by the National Science Foundation and who have become qualified to teach the new "alphabet" science courses. This is particularly important. Consider the case of a teacher who wants to change over to the teaching of CHEM Study chemistry. This is a laboratory oriented course. CHEM Study represents a change in the philosophy of the teacher himself and in his methods of teaching.

2. It appears that there is some science equipment in our schools that is not being used. This seems to have been brought about by unwise buying on the part of some teachers or by having teachers buying items and then leaving the system. The replacement teachers then do not use these items.

3. Care of science equipment is not as good as it could be. Teachers need more help in maintaining the equipment they now have.

4. It is felt that all science classrooms should have overhead projectors.

III. PHYSICAL FACILITIES

1. Some science is taught in classrooms that are not designed for science instruction. Storage space for science equipment is not provided in these rooms. Gas, water, and electrical outlets are missing. No work space is provided. It is felt that a laboratory approach to science teaching would be extremely difficult if not impossible.

2. Many of the regular science classrooms are too small. This limits pupil movement and therefore restricts laboratory work.

3. Sharing of laboratories is causing some difficulty. This forces teachers to remove equipment during a class period and then return it during a later period. The teacher that uses a laboratory for one period has to set-up and take down in the period. Some laboratory exercises are too long to permit being performed in this way.

IV. SCHEDULING

1. Most science teachers in grades 1 to 6 do not have a completely free and unencumbered period to prepare for their classes. This will be a necessity if we go to a laboratory-oriented course.

RECOMMENDED CHANGES FOR CURRICULA IN SCIENCE EDUCATION

Convictions regarding the aims and objectives of science education have been given. Comments have also been made on the shortcomings of existing curricula in these areas when evaluated in terms of our stated objectives. Associated problems relating to the effectiveness of science curricula were also presented.

Recommended below are changes which, in our opinion, will provide curricula appropriate to our time and within which there lies a greater likelihood of attaining our objectives.

1. A number of our science teachers are not adequately prepared in their principal subject and in supporting disciplines for generally effective implementation of a modern science curriculum. We have presumed, therefore, to make the following recommendations with regard to teacher preparation:

    a. We should work toward curricula requirements at the college level for prospective secondary school science teachers that would in all cases leave the teacher eligible to enter graduate school in some science discipline.

    b. Where teachers do not qualify for graduate work in science because of a lack of undergraduate background, significant incentives should be established for completion of additional undergraduate courses prerequisite to graduate study in the science discipline.

    c. In order to combat personnel obsolescence, a program of in-service education should be established for science teachers. By this, the committee means that semester length courses in areas of science be established (Jr. High included) and that credit, undergraduate and/or graduate credit be given to the successful participants. This credit could be applied to certification requirements, Masters or Master plus 30 requirements or toward whatever incentives are provided in "b" above.

2. That the Allen Parish school system consider the feasibility of establishing a central store for improving the methods of procurement, ordering, storing, and distribution of science equipment and supplies.

3. A major problem for any educational system is to offer parallel curricula: One leading to advanced study, and the other providing for students the knowledge necessary to earn their livelihood in pursuits related to science and/or engineering after completing only a secondary school education. We do not have the answers to the problems associated with the training and education of the latter students. The problem is paramount in our educational program and we recommend that it should receive immediate study. We recommend that the high schools consider the addition of an applied course in chemistry and physics for the non-college bound student.

4. It is recommended that a minimum of 30 clock hours of laboratory work each year be included in the biology, chemistry, and physics courses. Student participation in the educational process through laboratory exercises and field study should be extended downward to, and including, the elementary grades. Student time given to this kind of experience should generally increase as the grade level moves upward.

CLASSROOM DEMONSTRATIONS AND DEVICES FOR THE TEACHING OF SCIENCE

Structure of a Bunsen flame can be demonstrated by adjusting the flame to above five centimeters and holding a splint horizontally at various levels. Heat intensity for each level will be indicated by the degree of scorch on the splint. This may be varied by using a plain card held perpendicular and slightly tilted in the flame. A scorch pattern will appear showing heat intensity of various areas of the flame. A wire gauze held in the flame will show by its glow same conditions. Probe the flame with a small thermocouple connected to a sensitive ammeter and interpret.

Allow students to check the pH of their own saliva by using Hydrion paper. The color chart (usually on the Hydrion vial) will indicate quite a range of pH through the class.

Molecules of water have spaces between them as evident when a long test tube or graduate is filled three-fourths full of water and then completely filled carefully to capacity with alcohol. Place thumb over end of container and invert to mix the liquids. The container will no longer be filled to capacity. Can use 50 cc of Alcohol and 50 cc of water. Note capacity.

One demonstration seldom offers so many illustrations as does "Barking Dogs", yet remains so simple to perform. Dissolve a small amount of white phosphorus in carbon disulfide. A few drops of this solution on filter papers placed on top of a number of empty glass cylinders of varying capacities will illustrate:

a. Solubility and physical change as P dissolves in CS_2
b. Evaporation as CS_2 evaporates leaving P on filter paper.
c. Settling or diffusion of a heavy gas as CS_2 mixes with air in cylinders.
d. Spontaneous ignition as P catches fire on papers.
e. Explosion and combustion as CS_2 and air explode in cylinder.
f. Oxidation and combustion as P catches fire and paper burns.
g. Incomplete combustion as evident by sulfur deposited on cylinder walls.
h. Natural frequency of cylinders differ as pitch of explosion differ.

Mix a little concentrated sulfuric acid and potassium permanganate in an evaporating dish. Dip a glass rod into the mixture and immediately touch the rod with attached mixture to the wick of an alcohol lamp. The alcohol ignites.

Oxygen may be prepared by the action of enzymes in yeast or six per cent solution of hydrogen peroxide, surface action of manganese dioxide on hydrogen peroxide, heating sodium nitrate, or the interaction of sodium peroxide on water.

Show examples of chemicals mentioned in text as they are discussed. The difference in chemical and physical properties of substances is made real to the students by such simple means as, for example, heating separate test tubes of iodine and sulfur.

Cup hands over an unlighted Bunsen burner to collect gas. Ignite this gas at a lighted burner and carry the flame back to ignite the gas of the first burner to show that flame results from a burning gas.

Hold a match head in a Bunsen flame in such a manner that the stick burns but the head does not ignite. This is evidence that some parts of the flame are cool.

Mix one part sugar with three parts potassium chlorate. Incorporate Na, Ba, Ca, Sr, Cu, and BO_3 with portions of the mixture on a long trough. Light one end and observe the different colors which appear in the flame.

The green flame characteristic of borax can be shown by burning alcohol to which a little sulfuric acid and borax have been added.

Fill with natural gas a half gallon syrup can having a hole cut on the side near the bottom and another in center of lid. Ignite the gas as it comes from the hole in the lid. Flame will at first be large and luminous, gradually changing to intensely hot flame, as air is drawn in from the bottom hole and mixed with the gas. The gas and air mixture will eventually explode on reaching the proper proportions in mixture. Called expect the unexpected.

Build a miniature volcano cone with deep depression in top. Place in the depression some ammonium dichromate mixed with a small amount of powdered magnesium. Push a piece of magnesium ribbon into the mixture. Light the ribbon to ignite the mixture. A realistic volcanic action ensues. Also can use ordinary match head as a fuse when placed in middle of cone.

Combustibility of certain dust particles in air can be vividly demonstrated by placing corn starch in a handkerchief or cloth bag and dusting it through the cloth mesh into a flame.

Spontaneous ignition results when glycerin is dropped on a small heap of potassium permanganate. Magnesium powder along the edge adds to spectacle.

When it is desired to collect the hydrogen displaced from water by sodium metal, it is sometimes difficult to get the metal under water and into the container without unwanted incident. The sodium metal can be placed in a gelatin capsule half. The capsule can be pinched closed with tweezers and inserted in the collecting container where it will surface without carrying air.

Dust explosion apparatus can be used to show what happens when dust or fine particles are trapped in a closed area. Use lycopodium powder to show explosion effects.

A glass filled with water above the rim, being held in by surface tension will float a cork in its center. In a glass only partly filled with water the cork will be pulled to the glass.

Moth balls placed in a tall cylinder of salt water that contains dilute hydrochloric acid and a small amount of zinc granules will rise and fall in a interesting manner. Also can use baking soda and/or citric acid. Vinegar is too slow.

A handkerchief saturated with 70% alcohol diluted with an equal amount of water will not scorch or burn when the alcohol is ignited. Keep the handkerchief moving.

Pierce gelatin or Jello with a needle having formic acid on it. The gelatin will form a blister or a swell as a person does when stung by a bee.

Solubility of ammonia gas is quickly demonstrated by putting five ml. of ammonium hydroxide in a 500 ml. flask equipped with a one-hole stopper, glass tubing drawn to a nozzle on one end, and attached to long heavy rubber tubing. Heat the flask and ammonium hydroxide until ammonia gas comes from the open end of the tube. Place tube end in water and await action. Also called the Ammonia Fountain.

12 grs. of calcium acetate poured into forty-five millilieters of water will form a false gel that resembles canned heat when poured into 300 ml. of alcohol.

Iodine crystals added to ammonium hydroxide form nitrogen tri-iodide. These crystals are extremely sensitive when dry and will explode on being touched delicately with a feather.

Aluminum powder mixed with iodine will ignite when a drop of water is added.

Show that the wetting property of water is increased with the addition of detergents added. Place a piece of wool yarn, or non absorbent cotten (ducks), on each surface and observe the time required for the wool to sink.

A chemical garden can be grown in a solution of 150 ml. of water to which 35 ml of sodium silicate has been dissolved. Growth will start when crystals of compounds containing colored ions such as Cu, Co, Ni, Fe, and Al are addad to the solution.

Zinc powder mixed with ammonium nitrate will produce voluminous white smoke when ignited at arms length with a Bunsen burner.

The patriotic colors are produced by pouring sodium hydroxide solution into three beakers containing one each of the following solutions: phenolphtalein, lead acetate, and copper sulfate.

The effect of heat treatment and tempering of metals can be demonstrated by heating bobby pins to redness in a Bunsen flame. Dip one heated pin in cold water to chill. Allow the other pin to cool slowly. Compare these two pins with one that has not been heated by bending each one.

The difference in degree of solubility of a solid in various liquids can be demonstrated by carefully pouring carbon tetrachloride, water, and ether into a cylinder to layer them. A few crystals of iodine dropped through the layers will dissolve as they fall through the different layers. The degree of color in the liquids will indicate the amounts dissolved.

Take a small piece of potassium metal (size of pea) and insert into a cotton ball. Place on asbestos mat or inside of pyrex beaker. Drip ice cube water over the cotton. Observe what happens. Also called starting a fire with ice cubes.

Make a mixture on a piece of asbestos siding consisting of one part sugar, one part potassium chlorate. Pile this mixture into a cone or near pyramid shape. Stand approximately two feet away and add one drop of concentrated sulphuric acid to the tip of the cone. Note color of flame, the amount of smoke and light given off from this chemical reaction.

By heating the tip of a glass rod and placing it over the mouth of a beaker which contains a very small amount (3 cc's) of carbon disulfide, spontaneous combustion will be illustrated.

Show effects of molecular strain by taking a Bologna bottle and hammering nails into various pieces of wood. After pounding and showing how strong the bottle is, drop a piece of carborundum stone into the flask itself. Watch closely to see what happens.

Fill a glass to the brim with water. Place it on a level surface. Drop nails, clips, washers and other small metal objects into the glass of water, one at a time. You would expect some water to spill out every time an object falls in. But nothing of the kind happens. Instead, the water rises higher and higher above the top of the glass. You will be amazed at the number of small objects that can be added to the water before it starts to spill over. The level of water in the glass can get to be about 1/4 of an inch higher than the glass.

Sprinkle fine talcum powder (baby powder) on water in a dish. Touch a soapy toothpick to the powder. The surface tension weakens at that point and you see the powdered water suddenly pulled away in all directions by the stronger surface tension elsewhere.

Float a needle or razor blade on the surface of water. Gentle lower it flat onto the water. Surface tension of the water keeps it afloat.

Identify a fresh egg from one that has been boiled by spinning them on a flat surface. One stops sooner.

Air-A Real Material. Tilt an "empty" upside-down glass under water in a pot. Air bubbles rise to the top of the water. And as the air gets out, water goes into the glass. Actually the glass was not empty at all. It was filled with a real material-air.

Cover a full glass of water with a waxed paper. Press down along the edges to make a tight seal. When turned upsidedown or sidewards, outside air pressure keeps the water from falling out.

Moisten two "plumber's friends" and push the ends together. Air is pushed out. When the rubber tries to expand a low pressure is caused. Higher air pressure outside keeps the rubber ends together and prevents them from being pulled apart.

Make one small hole in a can of juice. The liquid comes out with difficulty because of outside air pressure. Make another hole and the liquid flows quickly.

Could air crush a metal can? Try this.

Get a pint or quart can that has a small screw cap. Clean out the can. Heat about half a cup of water in the can, on the stove. (Be careful. It's hot.) Let the water boil for about a minute. Shut off the heat and quickly cover the can tightly with its cap. Carry it to the sink, using a stick or pliers to avoid touching the hot metal. Pour cold water on the can. It collapses as though run over by a truck! Why?

Press a suction cup or "plumber's friend" against a smooth surface. When the rubber springs back it causes a low pressure under the cap and higher air pressure outside makes it stick.

Blow up a balloon. High pressure from your body pushes air into it. Puncture the balloon with a pin. The high pressure causes air to rush out rapidly to make a loud noise.

Moving Air. Hold a strip of paper in front of your lips, with the strip hanging downward. Blow against the paper. It is pushed away by the air and rises. The moving air creates a high pressure as it strikes the paper.

A kite remains aloft in this way. The wind creates a high pressure against the broad surface of the kite and pushes it up and back.

Now blow over the top of the strip. Again the paper rises. The paper would rise only if the pressure is greater underneath the paper than above it. Since the pressure under the paper is not changed in any way, the moving air must have caused a lower pressure on top of the paper.

About 250 years ago, the scientist Bernoulli discovered an important principle that was later used to design airplane wings. According to Bernoulli's Principle a fluid (material that flows) has lowest pressure wherever it moves fastest.

Hold a piece of paper with the edges hanging downward. Blow between the two hanging edges. Fast-moving air causes a low pre .ure and the two sides of the paper come together.

Use the outlet end of a vacuum cleaner to keep ping pong balls and balloons riding on the air stream in midair. The balls are pushed inward into the low pressure of the fast-moving air.

Making Carbon Dioxide. You can easily make carbon dioxide from two simple household "chemicals": Put a spoonful of bicarbonate of soda in a glass. Pour in a small amount of vinegar. The powder at the bottom of the glass bubbles and forms a froth. While the mixture is bubbling use a pair of tongs to lower a lighted match into the glass. The flame goes out.

Carbon Dioxide and Life. Blow through a straw into a small amount of limewater. Before long the limewater turns quite milky. This shows that there is a great deal of carbon dioxide in your breath. Why?

A relatively cold flame may be produced by igniting a mixture of carbon-tetrachloride and carbon disulfide (or water and alcohol). In preparing the mixture, add 40 cc of carbontetrachloride and 50 cc of carbon disulfide. A handkerchief may be dipped in the mixture and held in the hands while burning if it is kept moving.

To demonstrate Bernoulli's principle cut a circular piece of cardboard slightly larger than the end of a thread spool. In the center of the circular cardboard push a straight pin to the head. Set the spool over the pin point and down on the cardboard. Blow in the other end of the spool. The cardboard will cling to the spool as long as there is air motion through the spool.

Submerge a beaker in a glass container of water filling the beaker with water. Invert beaker to up-side down position under water. Invert another beaker and submerge so that air is trapped in it. Pour air from one beaker into the other, pouring up. Note fluid nature of the gas.

Fill a flask two thirds full of water and bring to boiling. Cork the flask and invert. Place ice cube on bottom of flask and see water begin to boil again. If the flask is corked with a one-hole stopper with a glass tube extending almost to the bottom of the flask, boiling can be effected by reducing the pressure of the entrapped air. Also called boiling hot water with cold water.

Wave motion and standing waves can be demonstrated by attaching a string to almost any small electric motor or vibrator. An electric shaver is ideal. Hang weights of varying amounts on the string to change wave length and frequency.

A wooden slat is covered with a newspaper except for a few inches which project beyond the edge of a table. The protruding slat is struck by a bat and it breaks instead of tearing the paper. Show that air exerts pressure.

Three students each holding a rod of different substance in a flame, will demonstrate the difference in conductivity of heat by their object from the flame. Use about the same sized rods of iron, aluminum, glass and copper.

"Dancing Moth Balls" rolled in sodium bicarbonate and put into a cylinder of very dilute hydrocholoric acid will rise and fall with regularity.

Measuring Air Pressure. Fill a soda or milk bottle with water and turn it upside-down in water in the sink, or in a large pot. You may be surprised that the water does not fall out of the opening at the bottom. It is being held up by air pressure pushing down on the water surface.

Fill a milk bottle with water through a double layer of cheese cloth covering its top. Turn the bottle upside down in the sink. Air pressure keeps the water from coming out.

Place a book on a balloon and blow into it. High pressure from your body lifts the book. Cars are lifted by air pressure in garages in a similar .ay.

Make a siphon. Fill a rubber tube with water. Place one end in a jar full of water and the other in an empty jar. Air pressure pushes water uphill from the full jar to the empty one.

Try a suction cup (or "plumber's friend") against different surfaces. Why does it stick better against smooth surfaces? Try the cup when it is wet. Why does it now work better?

Bounce a tennis ball. When it hits the ground the rubber is squeezed and air pressure is increased inside the ball. A moment later the high pressure pushes the ball out again to make it bounce.

Squeeze some lemon juice onto bicarbonate of soda in a glass. The resulting bubbles are carbon dioxide. Any acid will work. Most sour liquids, such as grapefruit juice, are acid and will also do the same thing.

Place some dry ice in an open carton. Note its size. After an hour the piece is much smaller because most of it has gone off into the air. Unlike ice, the carbon dioxide has skipped the liquid stage and gone directly to a gas. It is therefore "dry" ice. Try this also with camphor, iodine crystals and moth balls.

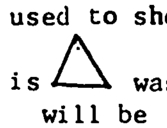
To demonstrate center of gravity outside of a body and the criterion for stability, borrow two pocket knives from the students. Push blades firmly (but carefully) into a pencil near the sharpened end with the handles beyond the point of the pencil. Balance it point downwards on your finger. If the center of gravity falls below the point of balance the system will be stable.

Bernoulli's principle can be shown by balancing an inflated balloon or beach ball on a jet of air from the output of a vacuum cleaner. The balloon will hover near the ceiling and will not fall off although tipped at a considerable angle. A ping pong ball balanced on a fine jet of water will illustrate the same.

There are three steps to the functioning of the human mind: a. observation b. incubation c. illumination. People stumble over more facts in a day that they see in a lifetime and meditate on little of that which they perceive, yet, enjoy ultimate satisfaction on attaining any degree of the final function.

Mnemonics are useful memory devices and should be used with emphasis on the facts rather than on the device for remembering. CREAM may mean the five kinds of energy: chemical, radiant, electrical, atomic and mechanical. Its plural might suggest the most profitable source of future supply.

Analogous inference, although not true or real, may be a hitching stat for some philosophy that affords a solid foundation for work. A triangle can be used to show relative importance of study and application to one's future. What you "is today determines what you "was" from any future date. Both what you "is" and what you "was" determines the length of your "will be" or future base line.



A dust explosion may be made from a syrup bucket or any can with a tightly fitting friction lid. Punch a hole in the bottom large enough to admit the small end of a funnel. Attach a length of rubber tubing to the extended funnel. Place a single thickness of Kleenex in the funnel to support a teaspoon of lycopodium powder. Place a six-inch lighted candle on the opposite side of the can from the funnel. Close the lid firmly and give a quick puff on the rubber tube. The lid usually hits the ceiling.

Look through a paper tube at some distant object with the right eye while holding a book over the other eye and close to the tube. It will appear that one is looking through a hole in the book.

Make a one-lung apparatus by taking a clean plastic cup and boring a hole through the center with a small hot darning needle. Through this hole insert a straw having a small balloon attached to one end. Use rubber bands to make ballon stay on straw. At the bottom of the cup where hole was bored, seal the hole around inserted straw with molding clay. Next, cut a small balloon in half and place the larger half over the mouth of the cup. This serves as the diaphragm for the lower rib cage. Cost of materials about 30 cents.

Want to see a clear glass beaker disappear? Make a mixture of 590 ccs of Carbon Tetrachloride and 410 ccs of Benzene solution. Take this solution and pour it into a larger vessel containing an empty 250 ml beaker. Pour this benzene and tet solution until the empty beaker is completely covered. Can you find the 250 ml beaker in this solution? Try it.

False burning of a handkerchief can be had by mixing a solution of equal parts water ans acetetone. Insert the handkerchief in this solution. Rinse same, hold handkerchief with a glass rod about two feet away from the body. Strike match, put near handkerchief and watch closely to see what happens. Did the handkerchief burn? Why?

Conservation of energy - support heavy pendulum from ceiling, draw back against nose, with your head against the wall. Release pendulum bob and stand nonchalantly awaiting its return. It cannot rise to greater than height from which it started. YOU are SAFE IF you do not MOVE!

Call this tubeless television. Project a lantern slide with a few simple words cut in a piece of metal foil so that the image is in mid-air. Direct beam of lantern out through open door so that it doesn't attract attention. Wave a white want in the plane of the image. Persistence of vision creates a complete image, apparently materialized in space.

Float a needle or razor blade on water by aid of its surface tension. Weaken the surface tension with a speck of detergent.

Scrape flecks of gum camphor on to a water surface and see the pieces propel themselves over the surface. A drop of olive oil on the surface stops the action.

SNAKES - REPTILES

1 No other group of animals is so surrounded by prejudice, superstitions, and foolish ideas as the reptiles. True, the reptiles in their numbers, have many poisonous species However, condemning an entire group because of the behavior of a few members is as logical as saying that all humans are dangerous because some commit crime.

2. The Biologist learns to recognize the relatively small number of dangerous reptiles and gives all of them a free range. But his knowledge of this group prevents him from mistreating the large number of harmless and beneficial reptiles he meets. With your children--you should adopt the attitude that the Biologist does.

3. In the U.S. there are approximately 275 species of reptiles. In the world there are approximately 6,000. In the U.S. there are 4 poisonous snakes, 1 poisonous lizard, 1 bad turtle (so to speak) and of course we stay away from the alligators and crocodiles which are considered dangerous.

Reptiles show the following characteristics:

1. Body usually covered with scales
2. Skin is dry, not moist and slimy
3. Feet, if present, have claws on their toes
4. Eggs internally fertilized and, if laid have a protective shell (Oviparous)
5. Certain species retain eggs made by the body and bring forth their young alive (Ovoviviparous)
6. No metamorphosis - changes - young resemble the adult in all forms

Distribution:

Snakes are not only the most numerous reptiles but are also the most widely distributed

1. Most abundant in tropical regions
2. Their numbers reduce in cooler climates to 126 species and only 22 species in Canada
3. No snakes are found in Alaska
4. Of the more than 2,000 species of snakes in the world, a relatively small number are poisonous.
5. The harm caused by these dangerous snakes is far outweighed by the valuable service rendered by others in destroying large numbers of insects and destructive rodents.

Snake Myths and Superstitions:

Probably no other animal has been surrounded with as many false ideas and ridiculous superstitions as the snake. It is unfortunate because it has resulted in the death of a large number of valuable snakes. People felt they were doing a service by killing off the harmless ones.

Here are some misconceptions about snakes:

1. They are not slimy - scales are dry, thick, and slick. Body feels cold because its internal temperature is no warmer than that of the surroundings.

2. They cannot jump from the ground, nor do they have to strike from a coil.

3. The forked tongue is not a fang and cannot inflict a wound.

4. No snake has ever been known to take the tip of its tail in its mouth and roll down a hill like a loop.

5. Snakes do not have hypnotic powers. They cannot charm victims nor cast spells.

6 No snakes have poisonous breath. Several species hiss loudly when aroused. This is a defensive act

7 Snakes do not steal milk from cows. The milk snake and other species live around barns and feed on rats, mice and other rodents. Would not drink milk if offered it

8. Rattle snakes do not add one rattle per year but 2 or 3 depending on mating and number of times they shed their skins

9. The removal of fangs from a poisonous snake does not make it harmless. New fangs soon develop.

10. The setting of the sun has nothing to do with the death of a wounded snake.

11. Snakes do not swallow their young for protection.

General questions about snakes commonly asked:

1. What do snakes eat?
   (a) All snakes feed on living animal prey.
   (b) No vegetarian snakes are known to exist.
   (c) We classify snakes into 3 groups, based on feeding habits.

2. What are these feeding groups?
   (a) Swallowing alive - insects, frogs, toads, lizards, and other small animals
   (b) Constriction - The python, boa, King, bull snake are more specialized - grab head, then coil, kill by shock - Constriction stops breathing and circulation
   (c) Poison the prey - use of venom

3 How can a snake swallow something larger than its mouth size?
   (a) Lower jaws are not fastened directly to the skull but fastened to a separate bone called "Quadrate Bone " Acts as hinges
   (b) Swallowing then takes place like pulling on a rope

4. How fast do snakes move or travel?
   (a) Less than 1 mile per hour. Humans can run short distances from 10 to 20 MPH.
   (b) Movement is lateral, caterpillar or side winding.

5. What type of reproduction do snakes undergo?
   (a) The majority of snakes are egg layers - (Oviparous)
   (b) A smaller group bring forth their young alive. The eggs are retained in the female. (Ovoviviparous). No nourishment from the Mother's body. (yolk)
   (c) Viviparous. Young nourished from mother as in higher animals.

6. What purpose does the pit serve?
   (a) Detection of warmth in other animals.

7. What are the 4 poisonous snakes in the U.S.?
   (a) Copperhead, moccasin
   (b) Rattlesnake (15)
   (c) Coral (2)
   (d) Yellow-bellied sea snake

8 What type do we have of the poisonous ones?
   (a) All of these
   (b) We have the diamond back which is the largest in the U S Range from 6' to 8'

9. What do the fangs resemble and can they be replaced?
   (a) Show picture

HYPO NEEDLE

10. How do snakes usually strike?
   (a) Low normally but can strike from rocks hitting the body high and above the boots.

11. Can snakes bite under water?
   (a) Yes. Glottis flap closes, does not strike as hard, however.

12. With a snakes head cut off, how can you distinguish the poison ones from the non-poison ones?
   (a) Rattle on tail
   (b) By color

NON-POISON EYE STRUCTURE

POISONOUS

13. What is the difference between a lizard and a snake?
   (a) Eye lid structure is missing.
   (b) Ear openings are missing.

14. What is the poisonous lizard called?
   (a) Gila monster

15 What is the largest lizard called?
   (a) Komodo dragon lizard - Dutch East Indies - 15' reptile/250 lbs

How to Make A Chemical Garden

Equipment needed:

Small pieces of brick - size of large nut
Bowl - approximately 6" to 8" in diameter
Assorted food coloring
Measuring cup or jar to mix chemicals
Tablespoon

Procedure:

(1) Place small pieces of brick in bottom of bowl. Distribute evenly throughout the bottom of bowl.

(2) Add ingredients in measuring cup separately in this order, but altogether.

4 tablespoons salt (not iodized)
4 tablespoons of liquid bluing
4 tablespoons of water
1 tablespoon of household ammonia

(3) Stir mixture well, then pour slowly over the bricks in the bowl. Do not move after all has been poured and do not touch crystal formation after they begin to set. (Crushing effect takes place). This garden will start growing within the 1st hour and will last approximately 2 weeks.

BIOLOGICAL MATERIALS AND EXPERIMENTS PRESENTED TO 1969-70 IN-SERVICE WORKSHOP, ALLEN PARISH

Due to the complexity of describing and listing experimental procedures and materials for biological experiments, the titles and objectives will be listed. Keep in mind this listing is simplified for reporting. Generally, all experiments with detailed procedures and materials can be found in the listed references.

The Microscope and Its Use

Objective: To become familiar with the parts and proper use of the microscope.

Properties of Living Things

Objective: To compare living and nonliving things; to place various plants and animals into their proper environments.

Basic Units of Life

Objective: To compare nonliving and living things to determine structural differences.

Unit Masses of Protoplasm

Objective: To examine plant and human cells to become familiar with the properties of protoplasm, the specialization of protoplasm within a cell and the similarities and differences in plant and animal cells.

Plant and Animal Cells

Objective: To examine cells of several plants and animals to see variations in cell structure.

Balance in the World of Life

Objective: To construct a food chain and to study the oxygen-carbon dioxide and nitrogen cycles.

Soil - Vital Factors of Environment

Objective: To study soil formation, composition, water-holding capacity and acidity or alkalinity.

Principles of Classification

Objective: To apply the principles of scientific classification to certain common organisms.

Osmosis Demonstrations

Objective: To demonstrate osmosis using one or more methods.

Photosynthesis

Objective: To review photosynthesis and demonstrate some of its products and requirements.

Parts of a Flower

Objective: To examine the parts of a typical flower.

Pollination and Fertilization

Objective: To study pollen grains, ovules and fertilization

Seed Germination

Objective: To study the germination of seeds.

Ants and Bees

Objective: To examine two groups of social insects, examples of the class Insecta of the phylum Arthropoda.

Common Order of Insects

Objective: To study representative members of common insect orders and their identifying characteristics.

Insect Pests and Their Control

Objective: To study some common insect pests and learn how to raise and control.

Structure and Adaptations of Snakes

Objective: To become familiar with the external structure and adaptations of a snake and to classify certain species as poisonous or nonpoisonous.

Study of Mammals

Objective: To classify a group of mammals according to order and to study the characteristics of mammals.

Maintaining an Aquarium

Objective: To maintain specimens and study association of various species.

The Nature of Foods

Objective: To learn how to test for various types of foods.

The Organs of Digestion

Objective: To study the arrangement and the relationship of the digestive organs and teeth in the body.

Microbes

Objective: To review the work of two pioneers in the conquest of disease and to study forms of disease, methods of infection and ways in which infectious organisms produce disease.

Body Defenses and Aids Against Diseases

Objective: To classify the body defenses against disease; to study types of immunity, chemotherapy, and antibiotic therapy.

The Conquest of Disease

Objective: To review historical milestones in the development of immunization procedures and summarize immunization methods in various infectious diseases.

The Prevention of Disease

Objective: To study problems relating to the prevention of infectious, organic, and functional diseases.

Mitosis and Cell Division

Objective: To review the structure of the cell nucleus and the substances in it that are concerned with heredity; to study the stages of mitosis and cell division.

Meiosis and Fertilization

Objective: To study chromosome changes during meiosis in the formation of eggs and sperms and the union of these germ cells during fertilization.

Principles of Heredity - I

Objective: To study Mendel's Laws of Dominance, Segregation, and Unit Characters.

Principles of Heredity - II

Objective: To study incomplete dominance involving one pair of genes, determination of sex, and sex-linked characters.

Plant and Animal Breeding

Objective: To study some of the principles which apply to plant and animal breeding.

Soil Conservation

Objective: To study various kinds of soil destruction and methods of soil conservation.

Water Conservation

Objective: To study the water cycle, the water-holding capacity of soils, and measures which have created water problems.

Forest Conservation

Objective: To locate the major forest regions of the United States and study the sustained yield plan of forest conservation.

Wildlife Conservation

Objective: To study conservation problems and restoration measures relating to fish, birds, and mammals.

Blood Typing

Objective: To show how blood typing is done and what happens when different groupings are mixed.

Seed Germination

Objective: To study the effects of gibberellic acid on germination and growth of plants.

Staining and Observing Blood Cells

Objective: To learn how to identify the various blood cells.

Microtechniques

Objective: To demonstrate fixation, dehydration, embedding, sectioning, staining and mounting.

Introduction of Laboratory Procedures

Objective: To show how to keep records, make lab reports and the cleaning of glassware.

Measurements

Objective: To review metric measurements and temperature.

Interaction Between Individuals and Species

Objective: To show the relationship between species and individuals.

Estimating Bird Population

Objective: To show how biologists estimate numbers of bird species.

Random Selection of Large Population

Objective: To show how individuals are established genatically.

Food Web

Objective: To show relationship of a balance in nature.

Steam Tables

Objective: To show the effects of the action of wind and water on soil erosion.

Review in Mixing of Solutions, Chemicals and Other Laboratory Materials.

Field Trips

Objective: To observe insects, wildlife, forests and soils in their natural environment.

How To Make A Home Incubator

Objective: To demonstrate the incubation of eggs and the observing of embryonic development.

Bacteria

Objective: To demonstrate the culture and staining of bacteria.

Formation of Oxygen

Objective: To demonstrate the release of oxygen by plants.

Enzyme Activity in Germinating Seed

Objective: To demonstrate the changes that occur in germinating seed.

Wood Anatomy

Objective: To show those differences which are visible without a microscope among the cross-sectional, radial and tangential phases of wood.

Paper Making

Objective: To show how a sheet of paper is formed.

Insects

Objective: To demonstrate metamorphosis - complete, incomplete and partial.

Insects

Objective: To study beneficial and harmful insects and show how they fit within the scheme of association of various species.

Taxonomy

Objective: To demonstrate the methods of collecting and preserving specimens.

Plant and Animal Hormones

Objective: To demonstrate the relationship and effects of hormones.

R E F E R E N C E S

INVESTIGATION OF CELLS AND ORGANISMS - Abramoff & Thomson
Prentice-Hall, Inc.

BIOLOGY - INTRODUCTION TO LIFE - Edwards -
Addision-Wesley Publishing Co., Inc.

LABORATORY INVESTIGATIONS IN BIOLOGY - Green & Bobrowsky -
Silver Burdett Co.

LABORATORY GUIDES FOR BIOLOGY - Peterson -
Silver Burdett Co.

BIOLOGICAL SCIENCE - BSCS -
Harcourt, Brace and World, Inc.

PLANT GROWTH AND DEVELOPMENT - Lee -
D. C. Heath and Co.

BIOLOGY INVESTIGATIONS - Otto, Towle and Crider -
Holt, Rinehart and Winston, Inc.

INVESTIGATING LIVING THINGS - Fitzpatrick -
Holt, Rinehart and Winston, Inc.

PLANT HORMONES AND GROWTH REGULATING SUBSTANCES -
Agriculture Handbook #336 - USDA.

TURTOX SERVICE LEAFLETS - General Biological Inc.

MASS REARING CORN EARWORM IN THE LABORATORY -
Agricultural Research Service - USDA.

INVESTIGATIONS INTO BIOLOGY - Korn and Korn -
John Wiley & Sons, Inc.

HUMAN PHYSIOLOGY - Morrison -
Holt, Rinehart and Winston, Inc.

BIOLOGICAL SCIENCE INTERACTIONS OF EXPERIMENTS AND IDEAS - BSCS -
Prentiss-Hall, Inc.

PATTERNS AND PROCESSES - BSCS -
Holt, Rinehart and Winston, Inc.

LABORATORY EXPERIMENTS IN PHYSIOLOGY - Levedahl & Barber -
Mosby Co.

BIOLOGY - PEOPLE AND THEIR ENVIRONMENT - South Carolina Conservation
Curriculum Improvement Project - Ferguson.

BIOLOGICAL FILMS PREVIEWED

Beginnings of Vertebrate Life

Biology in Today's World

Cell Biology: Life Functions

Cell Biology: Mitosis and DNA

Cell Biology: Structure and Compositions

Chick Embryo

Classifying Plants and Animals

Growth of Plants

Human Body: Digestive System

Human Body: Sense Organs

Osmosis

Photosynthesis

ALLEN PARISH WORKSHOP

CHEM/PHYSICS
References

Raths, Louis E., Arthur Jonas, Arnold Rothstein, and Selma Wassermann. Teaching for Thinking, Theroy and Application. Columbus, Ohio: Charles E. Merrill Books, Inc., 1967.

Pimentel, George C., Editor. Chemistry An Experimental Science. San Francisco: W. H. Freeman and Company, 1963.

McClellan, A. L., Editor. Teachers Guide for Chemistry An Experimental Science. San Francisco: W. H. Freeman and Company, 1963.

Malm, Lloyd E., Editor. Laboratory Manual for Chemistry An Experimental Science. San Francisco: W. H. Freeman and Company, 1963.

Hedges, William D. Testing and Evaluation for the Sciences in the Secondary School. Belmont, California: Wodsworth Publishing Company, Inc., 1966.

Young, Jay A. Practice in Thinking, A Laboratory Course in Introductory Chemistry. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1958.

Chemical Magic.

IPS Group, Educational Services Incorporated. Introductory Physical Science. Englewood Cliffs, N. J: Prentice-Hall, Inc., 1967.

The primary purpose in working with the teachers of chemistry, physics and physical science has been to show them how to teach for thinking. The secondary purpose has been to introduce them to some of the curriculum revisions, particularly CHEM Study and IPS, which try to promote more thinking on the part of the students.

It is pointed out in Teaching For Thinking that we do not know how to teach anyone to think. The best that we can do is to set the stage and assign activities that seem to promote thinking. Some of these activities are (1) observing, (2) comparing, (3) summarizing, (4) classifying, (5) interpreting, (6) criticizing, (7) looking for assumptions, (8) imagining, (9) collecting and organizing data, (10) hypothesizing, (11) applying facts and principles in new situations, (12) decision - making, (13) designing projects or investigations, (14) raising problems, and (15) coding. Some of these activities are applicable at any grade level and for most subjects, but they are particularly applicable to science courses. The requirement is to change from assigning rote learning to assigning activities that almost require thinking on the part of the student. Assign rote learning its proper place and move on to other learning activities. It is suggested that a teacher consult this list of activities each day and keep a check list of the ones that have been used. A deliberate effort should be made to include activities of which the record shows neglect.

Young in Practice in Thinking A Laboratory Course in Introductory Chemistry, teaches students laboratory techniques first by example (monkey see, monkey do) and exercises requiring practice in the techniques. In part two each pair of students is assigned a number of problems to solve. A laboratory report is required each week covering five points: (1) The phenomenon we observed, (2) The problem to be solved, (3) Our hypothesis, (4) Proposed test of pypothesis, (5) Validation of our pypothesis. A seminar type discussion is held each week in which each student's problem is presented and discussed. The third section presents much more sophisticated problems for which the students must design and carry out investigations. Stress safety in the laboratory. This approach can be used, in modified form, in junior high school and high school science classes.

The CHEM Study experiments give detailed procedures but require students to observe, compare, interpret, etc.

What We Have Done

In addition to discussing the procedures that promote thinking the teachers of this group have become familiar with IPS by doing three experiments on weighing. They have also done most of the CHEM Study experiments. In physics they have done the Milliken Oil Drop Experiment for determining the charge on an electron. They have done an experiment on "Disproportionation of Cuprous Oxide."

These teachers have previewed most of the CHEM Study films and several of the PSSC physics films. All were judged excellent or good. A list follows:

1. Gases and How They Combine
2. Gas Pressure and Molecular Collisions
3. Electric Interactions in Chemistry
4. Chemical Families
5. Vibration of Molecules and Molecular Motions
6. An Introduction to Reaction Kinetics
7. Catalysis
8. Equilibrium
9. Acid-Base Indicators
10. Electro-Chemical Cells
11. Molecular Spectroscopy
12. Crystals and Their Structures
13. The Hydrogen Atom as Viewed by Quantum Mechanics
14. Ionization Energy
15. Chemical Bonding
16. Shapes and Polarities of Molecules
17. Mechanism of an Organic Reaction
18. Synthesis of an Organic Compound
19. Bromine - Element from the Sea
20. Vanadium, A Transition Element
21. High Temperature Research
22. Transwanium Elements
23. Biochemistry and Molecular Structure
24. Measurement of Light
25. Time for Clocks
26. Photoelectric Effect
27. Periodic Motion
28. Frames of Reference
29. Free Fall and Projectile Motion
30. Mass of the Electron
31. Inetial Mass
32. Kinetic Molecular Theory

These films are available from the state's regional film libraries.

It is suggested that a unit or chapter be started with an "attention - getter", a short demonstration experiment or trick. We have used many of those from Chemical Magic. Them follow with experiments, films, and discussions. Tests should be mostly to check on understanding of processes and concepts.

Experiments Performed

The teachers put together the equal-arm balance from the IPS kits and learned how to adjust it.

Experiment: Precision of the Balance. Pages 12-12 in IPS textbook.
Purpose: To calibrate the balance to measure weight to the smallest repeatable amount.
Procedure:

1. Weigh several pennies, one at a time, using beads to balance them.
2. Using the rider on the right arm of the balance, mark a dictona the rider must be moved to balance 1 bead. Subdivid this into tenths and hundredths.
3. Reweigh each penny. Compare their masses.
4. Weigh separately to the nearest 0.01 bead a light object and a heavy object. Make these weighings several times, alternating light and heavy so the balance must be readjusted for each weighing. How precise is this balance?

Experiment: Beads and Grams
Purpose: To make a conversion table for changing mass in beads to mass in grams.
Procedure: Weigh masses of 1, 2, 5, and 10 g and all possible combinations of these and make a table in your notebook of the numbe of be-'s that balance these different masses. Plot a graph of mass in beads agai.st .ass in grams.

These experiments develop the idea of the arbitrariness of weight units. They also lead to understanding of precision of measurement, that is, repeatability.

Experiment: Disproportionation of Cuprous Oxide
Purpose: To use ideas of oxidation and reduction to interpret two reactions.
Procedure:

Part I. Weigh 5 g. of $Cu\ SO_4 - 5\ H_2O$ and dissolve in 50 ml. of water. Pour into a boiling solution of 3 g of hydrated sodium sulfite and 2.5 g of Na Cl in 25 ml. of H_2O. Cool. Add slowly to 100 ml of a boiling 5% solution of borax. Keep this mixture boiling until the typical brick-red color is uniform throughout. Filter, wash, and permit the Cu_2O to dry. Weigh. What was the per cent yield?

Part II. Add 2 ml. concentrate H_2SO_4 to 100 ml. H_2O. Heat 20 ml. of this mixture and add the Cu_2O from Part I. Filter. Collect the filtrate. Wash the precipitate, dry, and weigh.

2. Add Mg to the filtrate until the solution is colorless and a definite excess of Mg is present. Add dilute H Cl to remove the excess Mg. Filter. Wash, dry, and weigh theprecipitate.

This experiment requires good technique. The two precipitates in Part II should weigh the same. What happened in this reaction?

These teachers have performed the following CHEM Study experiments, procedures for which are given in the laboratory manual and pruposes in the teacher's guide.

1. Scientific Observation and Description
2. Behavior of Solids on Warming
3. The Melting Temperature of a Pure Substance
4. Combustion of a Candle

4a. Further Investigations of a Burning Candle

5. Heat Effects
7. The Behavior of Solid Copper Immersed in a Water Solution of the Compound Silvernitrate
8. Mass Relationships Accompanying Chemical Changes

8b. The Formula of a Hydrate

9. A Quantitative Investigation of the Reaction of a Metal with Hydrochloric Acid.
10. An Investigation of the Reacting Volumes of Two Solutions of Known Concentration
11. Reactions Between Ions in Aqueous Solution

12. A Study of Reactions
13. The Heat of Reaction
14. A Study of Reaction Rates
15. Chemical Equilibrium
16. Determination of the Solubility Product Constant of Silver Acetate
17. The Heat of Some Acid - Base Reactions
19. Applying LeChatelier's Principle to Some Reversible Chemical Reactions
20. An Introduction to Oxidation - Reduction
21. Electrochemical Cells
22. Reactions Between Ions in Solution
23. Quantitative Titation
24. Construction of a Logical Model
33. Development of a Scheme of Qualitative Analysis Using Reagents Labeled A, B, C.
34. The Relative Solubilities of Some Compounds of Some Metals of the Second Column - Qualitative Analysis
35. Qualitative Analysis of Ag^+, Hg_2^{+2}, and Pb^{+2}